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FINISHING ARTICLE HOLDER AND SUPPORT PAD

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This invention relates generally to finishing articles, and more particularly to a holder for such finishing articles.

There are many prior art finishing articles of various configurations and manufactured of various materials. In most cases a holder and support pad is specifically designed for a particular type of finishing article. This invention is particularly directed to that class of finishing article which are designed so that the entire surface thereof can be used. Such a finishing article is in most instances applied or affixed to its holder and support pad in
10 a blind manner, that is, the operator cannot view those parts of the finishing article and holder therefor which cooperatively engage for purposes of securing the article to the holder and in some instances for transmitting driving forces to the article.

In the finishing arts, it oftentimes become important to have central location of the finishing article upon the holder to obtain maximum utilization of the equipment. When an operator is utilizing a prior art holder and finishing article wherein the finishing article is attached in a blind manner to the holder therefor, it becomes quite difficult to locate the finishing article centrally upon
20 the holder. If such central location is difficult, it then becomes obvious that an undue amount of time is utilized and thus production is lessened in locating the finishing article upon the holder.

A long standing problem in the finishing arts, and particularly in the abrasive finishing art, has been that of "fly-off" of the finishing article from the support pad, particularly when operating at very high rotational speeds. The danger to personnel from such "fly-off" becomes particularly acute as the diameter of the finishing article increases. There are features available in some holders which do operate satisfactorily to lock the finishing article in place at quite slow rotational speeds. However, there is no known

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prior art finishing article and holder which has a positive safety locking feature which absolutely prevents fly-off under the most adverse operating conditions.

According to the present invention there is provided a holder for a finishing article, the article having at least one undercut hole, the holder having a front plate and at least one tab projecting from the front plate, and the tab having a small base portion and a larger front portion, which front portion is capable of engaging the entry opening of the undercut hole of the article so that upon rotation of the article with respect to the holder, the article and the holder can only be unlocked by reverse relative rotation, the article having a raised portion and the front plate of the holder being provided with a recess to accomodate the raised portion of the article, and characterized by locating apparatus disposed within the recess and capable of locating the raised portion into the recess.

The advantages of the present invention will become apparent from a consideration of the following description taken in conjunction with the accompanying drawings which are provided by way of example only and are not intended as a limitation upon the scope of the present invention as defined in the appended claims, and in which:

FIG. 1 is a perspective view of a finishing article and a finishing holder and support pad in accordance with the present invention;

FIG. 2 is an exploded view of a preferred embodiment of the finishing article holder and support pad in accordance with the present invention;

FIG. 3 is a cross-sectional view taken about the lines 3-3 of FIG. 1 and illustrating the locating means of a finishing article holder in accordance with the present invention;

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FIG. 4 is a cross-sectional view taken about the lines 4-4 of FIG. 1 and illustrating the positive locking feature of a holder in accordance with the present invention;

FIG. 5 is a partial cross-sectional view similar to that of FIGS. 3 and 4 but showing a finishing article attached to the holder; and

FIG. 6 is a cross-sectional view illustrating an alternative embodiment of a finishing article holder in accordance with the present invention.

Referring now to the drawings, and more particularly to FIG. 1 thereof, a finishing article holder in accordance with a preferred embodiment of the present invention is illustrated generally at 11 and includes a support pad 12 having a flexible peripheral area 13 and a rigid central area 14. The rigid central area 14 extends through the support pad 12 and to face 15 thereof. The face 15 of the support pad 12 defines a recess 16 which is adapted to receive at least a portion of the drive member of a finishing article.

A finishing article 17 includes a drive member 18 having a raised portion 19 with a plurality of openings 20 therein. The openings 20 are engageable by fingers or tabs 21 affixed to the rigid central portion 14 of the support pad 12. The particular finishing article as described forms no part of the present invention, but is illustrated for purposes of readily describing a holder and support pad for a finishing article in accordance with the present invention. By such a description of a particular finishing article, it should be expressly understood that no intention should be inferred to limit the holder and support pad to a specific configuration for use with a specific finishing article. The holder and support pad may be modified for different finishing articles without departing from the scope or spirit of the present invention. In some instances the support pad can be eliminated entirely.

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The holder 11 also includes a pin 23 which cooperates with one of the openings 20 in a manner to be described more fully hereafter to positively lock the finishing article 17 to the holder 11.

Referring now more specifically to FIG. 2, there is illustrated in an exploded view a presently preferred embodiment of a finishing article holder and support pad. The exploded view illustrates the relative positions and sizes of the various parts making up the support pad and holder. As is illustrated in FIG. 2, the holder includes the support pad 12 having a flexible periphery 13 and a
10 rigid central section 14 which comprises a hollow cylinder 31. The face 15 of the pad 12 defines the recess 16 as above described. As is illustrated in FIG. 2, the cylinder 31 extends from the face 15 of the pad 12 completely through the pad and out the back surface thereof. The cylinder 31 is permanently and rigidly affixed to the pad 12 and is preferably molded in place. The back surface or top surface of the cylinder 31 is substantially closed. Fitted within the cylinder 31 is a resiliently deformable means, such as a spring 32 the upper portion of which rests against the closed end of the cylinder 31. Locating means in the form of a ring 33 is fitted
20 around a body member or plug 34 and is so constructed as to have an inwardly directed flange 35 which engages an outwardly directed flange 36 to the lower surface of the plug 34. The spring 32 fits around the outer area of the plug 34 and the lower surface of the spring 32 engages the upper surface of the ring 33. The plug 34 fits within the cylinder 31 in such a manner as to provide a slot-like recess in the surface 15 of the pad 12. The slot-like recess is located within the recess 16 defined by the surface 15. The side portion 37 of the locating ring 33 extends through the slot-like recess provided between the outer surface of the plug 34 and
30 the inner surface of the cylinder 31. In this manner, the locating

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ring 33 is movable in a piston-like manner; that is, backwardly into the interior of the cylinder 31 and forwardly toward the face 15 of the pad. The spring 32 constantly urges the ring 33 forwardly so that the side portion 37 thereof extends through the slot-like recess and into the recess 16 formed in the face of the pad 12.

The plug 34 is held in place within the inner portion of the hollow cylinder 31 by means of a threaded stud 38 extending from the upper portion of the plug 34. The threaded stud 38 is fitted within the opening, which is also threaded, in the upper surface of the cylinder 31; the opening and the upper surface of the cylinder 31 not being illustrated in FIG. 2. The plug 34 defines an opening 41 in the lower face thereof and extending upwardly into the body of the plug 34. In the presently preferred embodiment, the opening 41 extends through the entire body of the plug 34 and partially into the threaded stud 38 extending from the upper surface of the plug 34. Such location of the opening 41 is more fully illustrated in FIG. 4 and will be described more in detail during the description of that figure.

A pin 42 is movably disposed within the opening 41 and a resiliently deformable means, such as a spring 43 fits around the lower portion 44 of the pin 42. The spring 43 is also seated within the opening 41 of the plug 34. An end cap 45 is seated against the lower face of a plug 34 and is held in place by a bolt 46 which enters through the central opening 47 in the cap 45 and threadably engages a central opening 48 in the lower surface of the plug 34. The cap also defines an opening 51 through which the small diameter section 44 of the pin 42 may extend during operational conditions as will be more fully described below, but through which the spring 43 does not extend. Thus the spring 43 is trapped within the opening 41 and between the shoulder on pin 42 and the cap 45. As above

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described, the fingers or tabs 21 are used to cooperate with the drive member of a finishing article to hold it in place upon the holder in accordance with the present invention.

A knurled nut 52 having a threaded central opening 53 therein threadably engages the threads upon the stud 38 of the plug 34, the stud 38 extending through the opening in the upper surface of the cylinder 31. The nut 52 is utilized to drive the pin 42 forwardly against the force of the spring 43 to lock a finishing article in place upon the surface 15 of the holder in accordance with the present invention. The operation of the knurled nut will be more fully described in conjunction with FIG. 5.

Referring now more particularly to FIG. 3, a holder in accordance with the presently preferred embodiment of the present invention is illustrated partly in cross-section, and specifically to illustrate the locating means of a holder in accordance with the present invention. The various parts illustrated in FIG. 3 are designated by the same numerals as used in FIG. 2, and therefore a detailed description of these various parts as illustrated in FIG. 3 will not be given. From the above description and by viewing FIG. 3 it should become clear that the plug 34 fits by way of its threaded shaft into abutting relation with the upper surface 40 of the cylinder 31 in such a manner that a slot-like recess 61 is provided between the outer surface 62 of the plug 34 and the inner surfaces 63 of the cylinder 31. The locating ring 33 is movably disposed within this recess in such a manner that the side portion 37 thereof fits within the slot-like recess 61 and extends outwardly from the face 15 of the pad 12. The radially inwardly directed flange 35 of the locating ring 33 abuts against the radially outwardly directed flange 36 of the plug 34. In this manner the outwardly directed flange 36 operates as a stop means for the locating ring 33 to thus limit its forward travel.

As above pointed out the ring 33 is urged forwardly by the spring 32 which is held in place within the slot-like recess 61 between the upper closed end 40 of the cylinder 31 and the radially inwardly directed flange 35 of the ring 33. As is shown in FIG. 3, the cap 45 is in place upon the lower surface of the pin 34 and includes the tabs or fingers 21 which cooperate with the openings 20 in the drive member 18 of the finishing article 17 to hold it in place upon the surface 15 of the pad 12.

In those areas of the finishing art, particularly where large diameter finishing articles are utilized and as above noted, the problem of fly-off does occur. Referring now more specifically to FIG. 4, which is a cross-sectional view illustrating particularly the locking pin feature of the present invention, there is illustrated the pin 42 seated in place within the opening 41 defined by the plug 34. The upper portion 65 of the pin 42 extends completely through the body of the plug 34, through the upper surface 40 of the cylinder 31, and into the threads of the stud 38. That portion of the opening 41 extending into the threads of the stud 38 is disposed in such a manner that approximately half of the diameter of the upper portion 65 of the pin 42 extends outwardly from the outer diameter of the threads on the stud 38. As is shown, the spring 43 is held in place between a shoulder 50 provided on the pin 42 and the cap 45 which is held in place upon the lower surface of the plug 34 by the bolt 46.

As is also illustrated in FIG. 4 the stud 38 has a bore 71 provided therein and which in accordance with the preferred embodiment of the present invention is threaded to receive the threaded shaft of a power tool with which the holder of the present invention may be utilized.

To provide a more positive engagement of the cap 45 with the

lower surface of the plug 34, it can also be seen that a protrusion 72 is provided in the cap 45 which mates with a depression 73 provided in the face of the plug 34. Additional such protrusions and depressions may also be provided if such is desired. These mating protrusions and depressions provide a positive means of communicating the drive force from the tool through the holder and to the finishing article affixed to the fingers 21 of the holder. The protrusion 72 may be provided in any manner known to the art, such as half-piercing or upsetting. Movement of the nut 52 in a downward direction
10 moves the pin 42 downwardly through the opening 41 so that the lower portion 44 thereof protrudes beyond the forward surface of the cap 45.

Reference is now made particularly to FIG. 5 which is a partial view similar to that of FIGS. 3 and 4 but illustrating a finishing article in place upon the surface 15 of the holder in accordance with the present invention. As is therein illustrated, the upwardly protruding portion 19 of the drive member 18 of the finishing article 17 is positioned within the locating ring 33 and particularly within its side portion 37 which extends outwardly from the face 15 of the support pad. The lower edge portion of the locating ring 33 is bearing
10 against the outer flange portion of the drive member 18.

As the operator wishes to locate a finishing article upon the holder in accordance with the present invention, he inserts the upwardly protruding portion 19 of the drive member within the side portion 37 of the locating ring 33. An upward pressure is then exerted by the operator against the finishing article which force is in turn transmitted to the locating ring 33 causing it to move upwardly into the position illustrated in FIG. 5. The upward movement of the ring 33 is stopped when the upper surface of the protrusion 19 comes into contact with the lower surface of the plate 45. This
) occurs after the finishing article is rotated with respect to the

face 15 of the pad 12 until the fingers 21 fall within the openings 20 of the drive member. Thereafter the finishing article is rotated until the fingers 21 have been securely locked in place within the upwardly protruding portion 19 of the drive member 18 of the finishing article as shown. In such a locked position, it can be seen that the spring 32 is urging the locating ring 33 forwardly and is thus exerting a force against the flange of the drive member 18 of the finishing article 17. This force causes a downward pressure to be exerted by the drive member 18 against the fingers 21 thus insuring
 10 a more positive grip by the fingers upon the drive member of the finishing article 17.

As is also illustrated in FIG. 5 the lower portion 44 of the pin 42 fits into one of the openings 20 provided in the drive member of the finishing article 17. When utilizing the specific finishing article described above, and as illustrated in these drawings, it can be seen that the pin 42 operates within any one of the openings 20 provided for attaching the finishing article to the holder. It should, however, be expressly understood that an additional opening may be provided in those finishing article drive members not con-
 20 structed as illustrated in the drawings so that the pin 42 may be inserted therein to positively lock the finishing article to the holder.

After the finishing article 17 is secured in place as above described, the operator may rotate the knurled nut 52 to cause it to travel downwardly thus pushing the pin 42 through the opening in the plate 45. The end 44 of the pin 42 then enters the opening 20 in the protrusion 19 through which the finger 21 has previously entered. This positioning of the pin 42 within the drive member 18 of the finishing article 17 positively locks the finishing article in
 30 place. As can be seen from FIG. 5, even if the finishing article is

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rotated in the reverse direction, it cannot be removed from the holder because the pin 42 has its lower portion 44 inserted within the opening and will therefore prevent sufficient rotation as needed to remove the article from the holder.

When it is desired to remove the finishing article from the holder, the nut 52 may be moved in an upward direction at which time the force of the spring 43 causes the pin 42 to be retracted from the opening 20 in the drive member of the finishing article. By completely separating the nut 52 from the upper portion 65 of the pin 10 42, the pin 42 will return to the position as illustrated in FIG. 4. At this point, the article can be removed from the holder.

It will become apparent to those skilled in the art that a finishing article holder as above described offers a very efficient and effective locating means for use with all finishing articles in which a blind engagement between the holder and the finishing article is required. Furthermore, the safety locking pin as provided completely eliminates the possibility of "fly-off" even under the most adverse of operating conditions.

Referring now more particularly to FIG. 6, there is illustrated 20 an alternative embodiment of a finishing article holder in accordance with the present invention. As can be seen, the structure is quite similar to that illustrated in the previous figures and where the parts are the same, the same reference numerals are used.

The basic difference lies in the construction of the rigid central portion of the holder and support pad. As is shown in FIG. 6, the rigid central portion is constructed from one solid member 81 which may be viewed as a composite of the cylinder 31 and plug 34 as shown in the earlier figures.

The solid member 81 is machined to provide a slot-like recess 10 82 therein. The spring 32, ring 33 and cap 45 are then assembled

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as shown. A bore 83 is provided in shaft 84 and is threaded to receive the drive portion of a power tool. The outer surface of the shaft 84 is also threaded to receive the nut 52.

An opening 85 is provided through the member 81 to receive the pin 42 in the manner above described.

The operation of the holder shown in FIG. 6 is identical to that above described.

There has thus been described two embodiments of a finishing article holder and support pad which permits quick and easy blind
10 location of the article with respect to the holder. The holder also has a safety locking feature to retain the article affixed thereto under all operating conditions. Although two specific embodiments of a holder for a finishing article have been described and illustrated above, it should be expressly understood that various changes may be made in the structure thereof without departing from the scope or spirit of the present invention as defined in the appended claims.

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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A holder for a finishing article having a drive member thereon which defines an opening therein, said holder comprising: a support pad having a rigid central area, said central area defining a recess and an opening therein; locating means movably disposed within said recess and cooperable with said drive member to locate said article on the face of said pad; resiliently deformable means disposed within said recess to urge said locating means forwardly; locking means movably disposed within said opening; means for moving said locking means into engagement with the opening in said drive member when said article is in operative engagement with said holder; and means for retracting said locking means from the opening in said drive member when said article is to be removed from said holder.
2. A holder in accordance with claim 1 in which said rigid central area is a metallic member and said recess is a slot-like recess formed within said metallic member and extending inwardly from the face of said pad
3. A holder in accordance with claim 2 in which said locating means is a ring-shaped member extending forwardly from the face of said holder.
4. A holder in accordance with claim 3 in which said locking means is a pin member and said retracting means is a spring disposed within said opening.
5. A holder for a finishing article having a drive member thereon which defines an opening therein, said holder comprising: a metallic cylinder defining a continuous circular recess extending from one face thereof into the interior thereof but less than the full length thereof and an opening therethrough; a shaft extending

from the opposite face of said cylinder; a ring having an inwardly directed radially extending flange disposed within said recess; a spring disposed within said recess between said flange and the terminus of said recess to urge said ring toward said one face of said cylinder, said ring having side portions extending through said recess and beyond said one face; a cap affixed to said one face of said cylinder for retaining said ring in place and limiting the movement thereof; a pin seated within said opening and extending through said cap; a nut threadably engaging said shaft for moving said pin into engagement with the opening in said drive member when the finishing article is affixed to said holder; and a second spring seated within said opening in said metallic cylinder for urging said pin away from said drive member.

6. A holder for a finishing article having a drive member consisting of a raised member on one surface thereof, said holder comprising: a support pad; a cylinder disposed centrally within said pad and having an opening at the face thereof; piston means disposed within said opening and having a portion thereof extending outwardly from the face of said pad to receive at least a portion of said drive member; resiliently deformable means disposed within said opening and engaging said piston for urging said piston forwardly; and stop means for limiting the forward travel of said piston.

7. A holder for a finishing article having a drive member consisting of a raised member on one surface thereof, said holder comprising: a hollow cylinder having a substantially closed end; a flexible support pad molded around said cylinder and adhered thereto, said cylinder thereby forming a cavity extending inwardly from the face of said pad; a cylindrical plug centrally disposed within and substantially filling said cavity and defining with the

walls of said cylinder a cylindrical recess; a flange extending radially outward on the outer surface of said plug partially closing the entry to said recess; a ring-shaped member having an inwardly extending radial flange movably disposed within said space and extending outwardly beyond the face of said pad, the flange on said ring-shaped member engaging the flange on said plug thereby to limit the forward movement of said ring-shaped member; and spring means disposed within said space between said ring-shaped member and the closed end of said cylinder to urge said ring-shaped member forwardly.

8. A holder for a finishing article having a drive member consisting of a raised member on one surface thereof, said holder comprising: a support pad having a flexible periphery and a rigid central area, said rigid central area defining a slot-like recess therein; locating means movably disposed within said recess and cooperable with said drive member to locate said article on the face of said pad; and resiliently deformable means disposed within said recess to urge said locating means forwardly.

9. A holder for a finishing article having a drive member consisting of a raised member on one surface thereof and defining an opening therein, said holder comprising: a support pad having a flexible periphery and a rigid central area, said rigid central area defining an opening therein; locking means movably disposed within said opening; means for moving said locking means into engagement with the opening in said drive member when said article is in operative engagement with said holder; and means for retracting said locking means from said opening in said drive member when said article is to be removed from said holder.

10. A holder in accordance with claim 9 in which said locking means is a pin.

11. A holder in accordance with claim 10 in which said opening extends through said rigid central area.

12. A holder in accordance with claim 11 in which said rigid central area is a metallic member having a shaft extending from the back surface thereof, said pin member extending through said metallic member adjacent said shaft, and said moving means is carried by said shaft.

13. A holder for a finishing article having a drive member consisting of a raised member on one surface thereof and defining an opening therein, said holder comprising: a metallic cylinder having a shaft extending therefrom; a flexible support pad molded about and adhered to said cylinder, said cylinder defining an opening extending therethrough; a pin member movably disposed within said opening; spring means disposed within said opening and engaging said pin member to constantly urge said pin member toward said shaft; and movable means carried by said shaft for moving said pin away from said shaft into engagement with the opening in said drive member when said article is affixed to said holder.

14. A holder for a finishing article having a drive member including a raised portion on one surface thereof, said holder comprising: a support pad having a central rigid portion, said central rigid portion forming a portion of the face of said pad and extending outwardly through the back surface thereof; ring-like locating means received within said central rigid portion of said support pad and adapted for reciprocal movement therein, said ring-like means having a portion thereof extending outwardly from the face of said support pad for receiving the raised member on the surface of the finishing article thereby to quickly and positively locate said finishing article upon said holder for engagement therewith; and resiliently deformable means continuously

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1 urging said ring-like locating means forwardly whereby pressure is applied upon said finishing article after its engagement with said holder.

15. A holder in accordance with claim 14 in which said central rigid portion is a hollow cylinder having one substantially closed end and one open end; a cylindrical plug affixed within said hollow cylinder and having a diameter less than the diameter of the inner surface of said cylinder thereby to define a continuous recess within said central rigid portion for receiving said ring-like locating means.

16. A holder in accordance with claim 14 in which said central rigid portion is a cylinder of solid material which has been relieved to define a continuous circular recess extending inwardly from the face of said support pad but less than the full length of said cylinder, said recess receiving said ring-like locating means.

17. A holder for a finishing article having a drive member including a raised portion on one surface thereof, said holder comprising: a support pad having a flexible peripheral portion and including a cylindrical metallic member forming a portion of the face of said support pad and extending through the back surface thereof; said metallic member having outer and inner cylindrical portions defining a continuous circular recess extending inwardly from the face of said support pad into said metallic member; a metallic locating ring received within said recess and reciprocally movable therein and having a portion thereof extending outwardly from the face of said support pad for receiving the raised portion on said finishing article thereby to quickly and positively locate said finishing article upon said holder for engagement therewith; and a spring received within said recess about said inner cylindrical portion for continuously urging said metallic ring forwardly

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whereby pressure is applied upon said finishing article after its engagement with said holder.

18. A holder in accordance with claim 17 in which said cylindrical metallic member is formed of a hollow cylinder having a solid cylinder of lesser diameter affixed thereto to provide said inner cylindrical portion.

19. A holder in accordance with claim 17 in which said cylindrical metallic member is formed of a solid metallic member which has been relieved to define said recess therein.

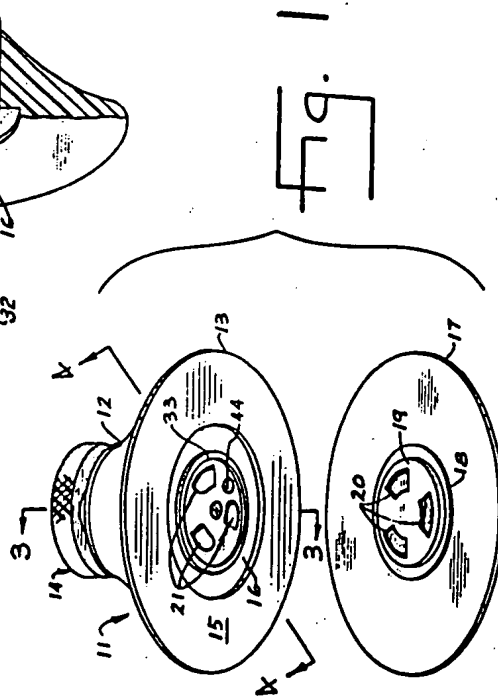
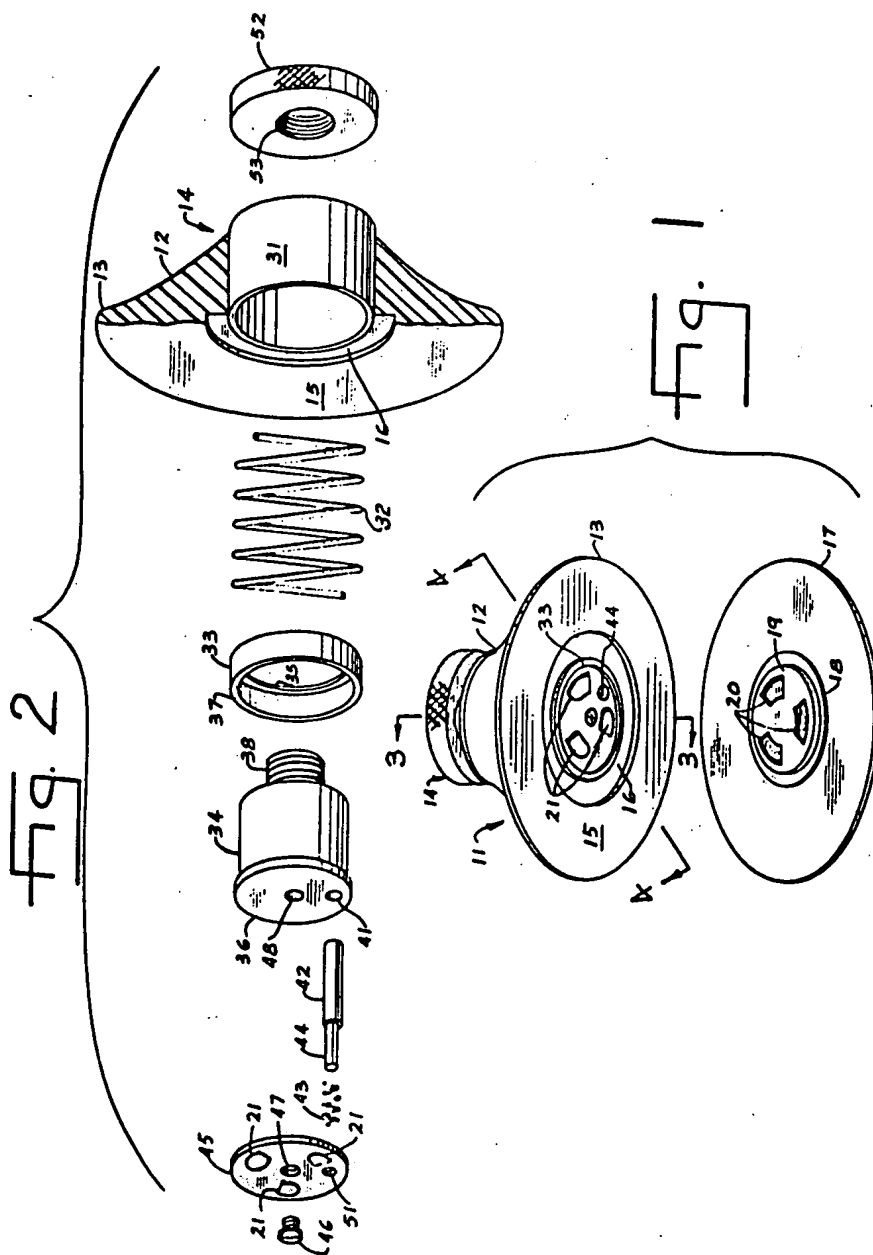
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FINISHING ARTICLE HOLDER AND SUPPORT PAD



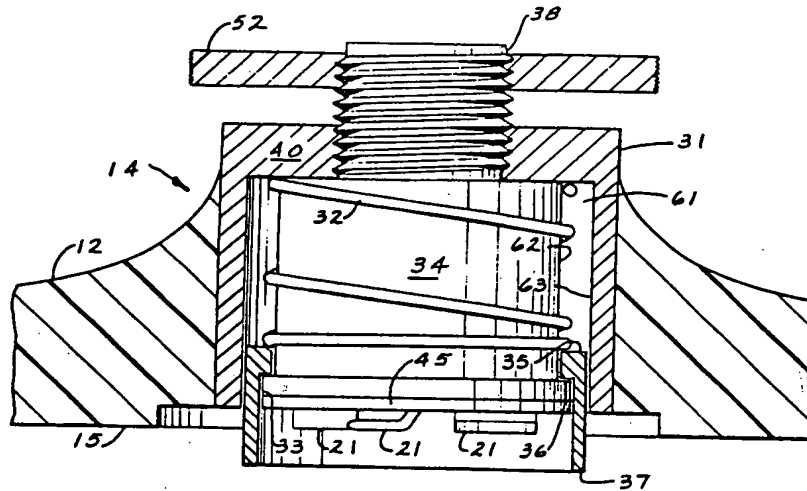


Fig. 3

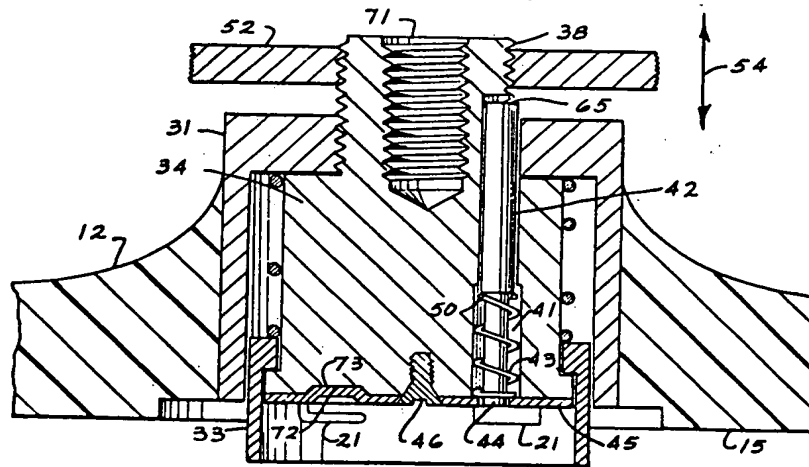


Fig. 4

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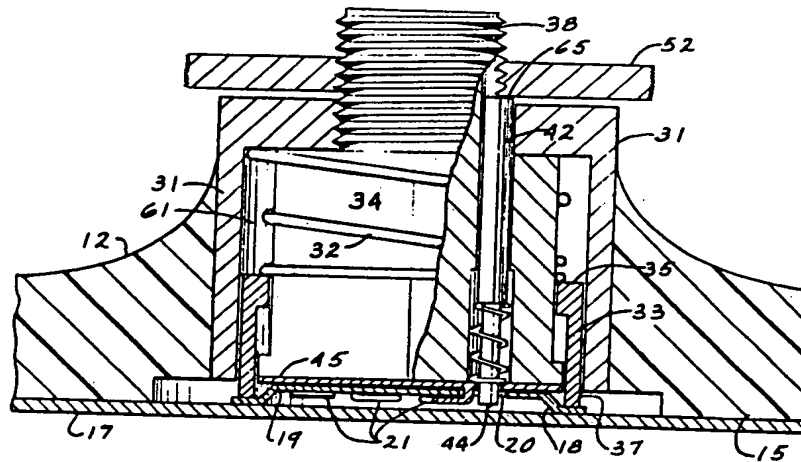


Fig. 5

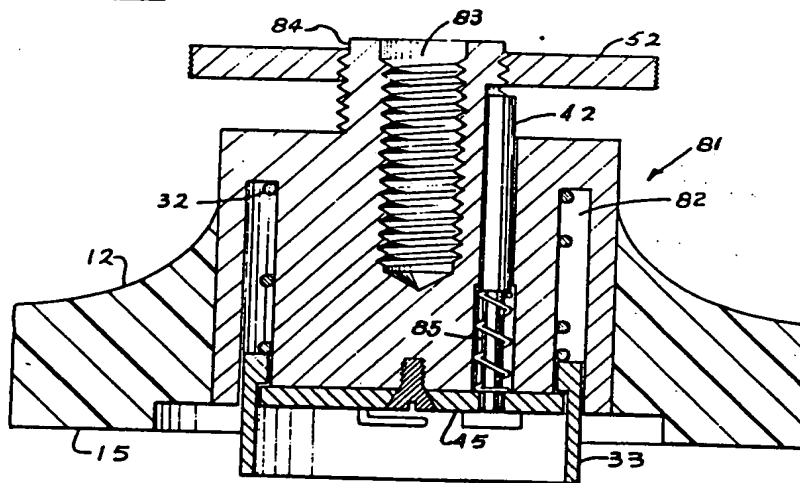


Fig. 6